and level of supportive care given was significantly higher in patients with icterus than without (P = 0.224) and P= 0.0081) respectively. Total days for disease resolution in patients with icterus was 32 days compared to 16 days for those without (p=0.022). Nine of the patients with icterus received specific treatment compared to only one in the anicteric group. Seven cases were diagnosed with VOD by the Seattle criteria at a median of day +15 post HSCT, but treatment was delayed by 1-11 days for lack of hyperbilirubinemia, 2 of these never developed hyperbilirubinemia; 4 of 7 cases died. Overall 2 with anicteric and 12 cases with icteric VOD died.
Discussion: The Baltimore criteria appear to be more stringent and cases with anicteric VOD do not meet these diagnostic criteria. This retrospective study describes the features of anicteric VOD at a single center. Even if the patients met the Seattle criteria, treatment was delayed for lack of hyperbilirubinemia or flow reversal on hepatic ultrasound, neither of which are required criteria. Patients with anicteric VOD had a better outcome than those with hyperbilirubinemia, but our study shows that there can be significant morbidity and even mortality associated with anicteric VOD. There seems to be a poor understanding and awareness of anicteric VOD as a diagnosis. Earlier disease recognition could lead to more prompt and aggressive treatment leading to improved outcomes.

226

Preservation of Ovarian Function after Hematopoietic Cell Transplantation (HCT): More Possible Than We Thought?

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Background: Gonadal failure is a major long-term health and quality of life concern in survivors of HCT. While ovarian dysfunction is nearly universal following myeloablative (MA) conditioning, it is likely variable after reduced-intensity conditioning (RIC) HCT where there are substantial differences in intensity. GnRH agonists, such as leuprolide, have been shown to decrease the rate of ovarian failure in those receiving conventional chemotherapy, but little is known about leuprolide's effectiveness in the HCT population. We sought to determine the impact of leuprolide on ovarian function in recipients of MA conditioning and evaluate the incidence of ovarian failure in women undergoing RIC HCT.
Methods: Post-menarchal females <50 years of age who were scheduled to undergo HCT were recruited for the study. Adequate ovarian function, as defined by a baseline FSH level less than 40 and normal menstrual cycles, was required. Those undergoing MA HCT were treated with leuprolide (long-acting 11.25 mg IM once + short-acting 0.2 mg daily for 14 days) prior to conditioning. MA regimens were variable. Those undergoing RIC HCT were observed with no intervention. RIC regimens generally included cyclophosphamide (50 mg/kg), fludarabine (150-200 mg/kg) and TBI (200-300 cGy). FSH was measured at baseline, day 100, 180, 1 year, and 2 years following transplant.
Results: A total of 19 women were included (9 in the intervention arm and 10 observation only). In the intervention arm (age 17 to 45 years), 6 of the 7 evaluable patients had malignancies and one had an inherited bone marrow failure syndrome (IBMFS). The observation arm (age 13 to 45 years) included 6 patients with aplastic anemia, 1 with a hemoglobinopathy, 1 with a metabolic disorder, 1 with an IBMFS, and a single patient with a malignancy. Two patients in the intervention arm were not evaluable (one died 34 days following HCT and the other was lost to follow-up). There were no adverse events related to leuprolide therapy. Five out of the 7 intervention patients were heavily pretreated with chemotherapy for their malignant conditions prior to HCT. The incidence of ovarian failure in women undergoing MA transplant who received leuprolide was 57% (4 out of 7 subjects) at day +180 compared to historically reported rates of ovarian failure of >90% after MA transplant. In RIC HCT, the ovarian failure rate was 20% (2 out of 10 subjects).
Conclusions: Leuprolide is not only safe, but it appears to have a substantial impact on ovarian function preservation after MA conditioning. These results were found despite the majority of these women having received significant gonadotoxic chemotherapy prior to being referred for HCT. In addition, early data demonstrate that RIC with cyclophosphamide, fludarabine and low-dose TBI is associated with a low risk of ovarian failure. Further studies are needed to confirm these exciting findings.

227

Bone Health Assessment in Patients Undergoing Hematopoietic Cell Transplantation

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Introduction: The increased survival of hematological patients has required to widen the care of these patients, with emphasis in factors related to quality of life and late mortality. Among them, osteoporosis (OP) is a fundamental problem. Patients undergoing hematopoietic cell transplantation (HCT) are at great risk of OP, mainly due to prolonged exposure to chemotherapy, immunosuppresants and the hypogonadism frequently associated to these treatments. Despite this, there is lack of strong evidence on this matter and HCT guidelines are not clear on this problem.
Objectives: To evaluate parameters related to bone health in patients undergoing HCT. To measure the frequency and severity of the alterations in this group of patients.
Patients and Methods: Observational and retrospective analysis of patients undergoing HCT at the Catholic University Hematology-Oncology Department. All patients undergoing HCT were recommended to have determination of 25-OH vitamin D, PTHi, Calcium, Phosphorus and bone densitometry (DXA). We included all patients with the evaluation before HCT (preHCT) and 1 year after HCT (postHCT). Statistical analysis was performed by SPSS v.21 software.
Results: We obtained data from 20 patients preHCT and 22 patients postHCT. Main diagnosis were acute myeloid leukemia (n=13; 32%), multiple myeloma (n=11; 26%), acute lymphoblastic leukemia (n=9; 21%) and Hodgkin's Lymphoma (n=5; 12%). Mean age was 40 years (range: 17-67) and 67% were males. In the preHCT group, the median 25-OH vitamin D levels

were 13,6 ng/ml (range: 4,9-26,7 ng/ml) and 100% of the patients were in the insufficiency range levels (<30 ng/ml). Median PTHi levels were 62,6 pg/ml (range: 24,4-223,7 pg/ml), and 46% of the patients had secondary hyperparathyroidism. In the postHCT group, median 25-OH vitamin D levels were 11,4 ng/ml (range: 4-29,4 ng/ml) and 100% had insuficiency levels. Median PTHi levels were 68 pg/ml (range: 37,4-135,8 pg/ml), and 56% of the patients had secondary hyperparathyroidism. 12 patients had DXA before HCT and 3 (25%) of them had DXA lumbar Z score less than -2.0. In 19 patients postHCT, 4 (21%) had decreased DXA Z score < 2.0. No difference could be established between autologous or allogeneic HCT in any measurement. Only the presence of chronic graft vs host disease (GVHD) was associated with higher PTH levels by ANOVA test. None of the other variables were associated with acute or chronic GVHD.

Conclusions: HCT patients represent a high-risk group of developing severe vitamin D deficiency, secondary hyperparathyroidism and decreased DXA levels. These data are a warning that this population of patients requires early intervention to prevent long-term complications. This report is the initial evaluation for the development and treatment of bone health in a prospective matter in HCT patients in our center.

228

Donor Cell Leukemia: A Prospective Study of Its Identification and Treatment

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Leukemia relapses occurring in donor cells, so-called donor cell leukemias (DCL) after allogeneic hematopoietic stem cell transplantation have been reported in several cases and still are considered as rare diseases. Cytogenetic analysis, flow cytometry and molecular testing have been used to confirm this event in the cases so far reported. The incidence of this condition is largely unknown, as well as the results of its treatment. We have prospectively searched for DCL in a 12-year period, in a single institution. In a group of 106 consecutive patients allografted because of leukemia we have identified 7 cases of DCL; six of them were allografted because of relapsed acute lymphoblastic leukemia (ALL) and one because of paroxysmal nocturnal hemoglobinuria/aplastic anemia; these figures suggest that the real incidence of DCL has been underestimated in previous studies. All the patients were allografted from HLA-identical siblings, employing a reduced-intensity conditioning regimen. The cases appeared with median of 10 months after the allograft; the number of blast cells when the leukemic activity ensued was above 50% in all cases, whereas the chimerism studies revealed more than 90% cells of donor origin. The origin of the leukemia cells was shown by microsatellites and with sex mismatch. Six patients with lymphoblastic DCL were treated prospectively with a pediatric-inspired combined chemotherapy schedule designed for "de novo" ALL patients. A complete response was obtained in 3/6 patients with lymphoblastic DCL, these patients being alive in a complete remission at 11,12 and 98 months after the diagnosis of DCL. The long-term DCL survivors remain full chimeras and did not need a second transplant. It is concluded that the prevalence of DCL may be higher if it is prospectively looked for, and that acceptable therapeutic results are obtained if patients are treated as "do novo" leukemias employing combined chemotherapy.

229

Health-Related Quality of Life in Survivors of Allogeneic Hematopoietic Stem Cell Transplantation Employing the Mexican Reduced-Intensity Conditioning

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Background: Quality of life (QOL) is an important consideration in the counseling, implementation, and post treatment management of arduous treatments for life-threatening conditions, such as allogeneic hematopoietic cell transplantation (allo-HCT).

Material and Methods: QOL was analyzed in leukemia patients who underwent allo-HCT using reduced intensity conditioning (RIC) on an outpatient basis at either the Centro de Hematología y Medicina Interna de Puebla of the Clínica Ruiz or the Hematology Service of the Internal Medicine Department of the Hospital "Dr. José Eleuterio González" of the Universidad Autónoma de Nuevo León, and who had survived above 12 months after the allograft, who could be approached, who were in a continued complete remission-with or without graft versus host disease and who were willing to respond to the questionnaire. Thirty-five patients fulfilling these requirements were included, and a sex and age-matched group of 35 reference subjects was also studied.

Results: Allografted patients were found to have a slightly better mental component summary than the reference subjects (53.23 versus 48.66 points, $p = 0.01$), whereas the physical component summary did not show a difference (54.53 versus 52.05 points, $p = 0.59$). Most of the differences between allografted individuals and reference subjects controls were not significant.

Conclusions: These data suggest that allografted individuals employing our RIC regimen, enjoy a health-related quality of life similar to that of reference subjects, adding, another advantage of this method of conducting stem cell allografting. However, more work needs to be done to elucidate the impact of RIC on QOL post-allo-HCT.

230

Increased Incidence of Fatigue in Pediatric Hematopoetic Stem Cell Transplant Recipients

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